INTERNATIONAL JOURNAL OF CIVIL ENGINEERING AND TECHNOLOGY (IJCIET)

ISSN 0976 – 6308 (Print)
ISSN 0976 – 6316(Online)
Volume 6, Issue 5, May (2015), pp. 01-04

Journal Impact Factor (2015): 9.1215 (Calculated by GISI)
www.jifactor.com

IJCIET

©IAEME

ENHANCED LOAD CARRYING CAPACITY OF ROOFING ELEMENTS

Sidramappa Shivashankar Dharane

SVERI's College of Engineering Pandharpur, Maharashtra, India

Shivaraj Gururaj Malage

195, East Mangalwar Peth, Solapur, Maharashtra, India

ABSTRACT

There are various roofing elements such as slab, G. I. sheets; A. C. Sheets, etc are in use. The load carrying capacity of these roofing elements can be enhanced by the grid pattern of folded plate action in both the longitudinal directions. Due to this the dead load and deflection of the slab will reduce with increase in moment and shear carrying capacity by enhancing its ductility. The principle of folded plate action in both the directions of the grid pattern designed for G. I. sheets and A. C. Sheets will also increase the load carrying capacity of the G. I. and A. C. Sheets.

Key words: Folded Plate Action, G. I. and A. C. Sheets, Slabs, Economy

INTRODUCTION

Today there are various roofing elements are in use which are subjected to bending, shear, deflection, axial compression. The effect of all these properties can be enhanced in all type of roofing by folded plate action. The folded plate action may be in one or two longitudinal directions. The load carrying capacity of following roofing elements can be improved by the folded pate action in one or both the longitudinal directions as per the behaviour of the roofing elements.

DESIGN OF SLABS

There are various types of slabs depending upon its behaviour and construction e.g. One way slab, two way slab, cantilever slabs, flat slab, circular slabs, grid slab, etc. The load carrying capacity of these slabs can be enhancing by the folded plate theory. For terrace slab/ roof the shape of these slabs may be rectangular trough, trapezoidal trough, corrugated, etc. But for intermediate floors the

cross section of the slab must be rectangular to get level and horizontal surface. In this case the folded plate action can be achieved by making the profile/ shape of the reinforcement as rectangular trough, trapezoidal trough, corrugated in one or both the directions, so that the folded plate action can be achieved up to certain limit. In cantilever slab the folded plate action is in only in one direction so that the corrugations, rectangular trough shape or trapezoidal trough shape can be given in one direction only along the cross section where as the straight bars can be provided along the longitudinal direction. In one way , two way , flat, and circular slabs the corrugations, rectangular trough shape, trapezoidal trough shaped reinforcements can be provided in both the directions in alternate form. Such slabs can also take the reversal of loading which is the lacuna of existing slabs.

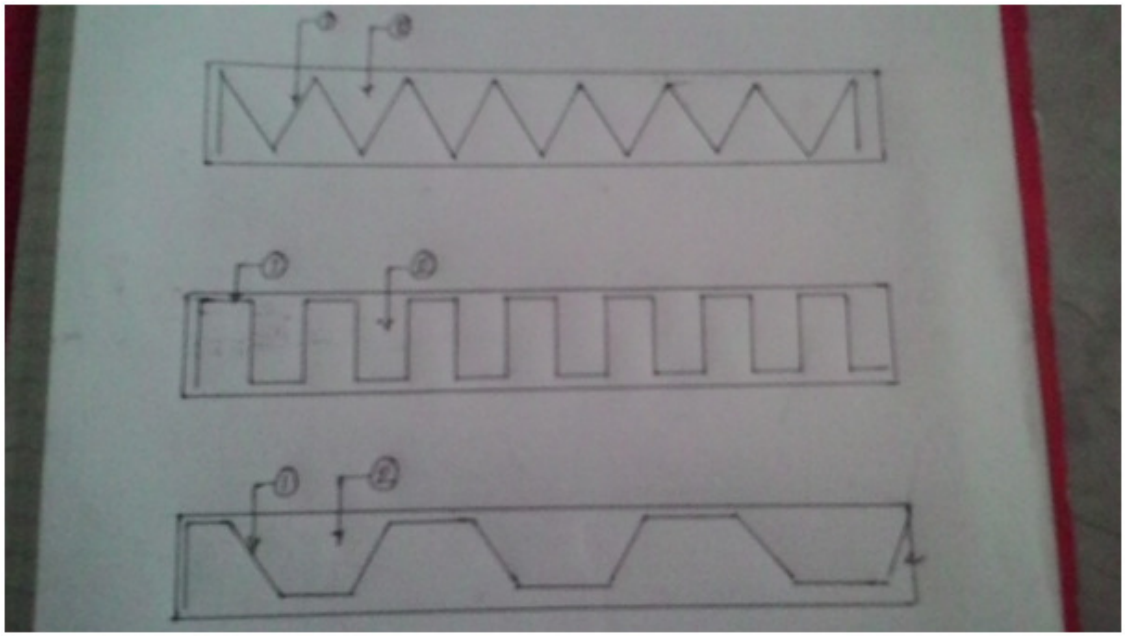

Fig 1. Reinforcement details of slab in both the directions.

Because of this the load carrying capacity, moment resisting capacity, shear resisting capacity and ductility will increase with reduce deflection and self weight. Also it takes into account the reversal of loading.

DESIGN OF G. I. AND A. C. SHEETS

The galvanised iron and asbestos cement sheets are in use as roofing elements for industry and low cost housing. In these sheets till date the corrugations or rectangular trough shape or trapezoidal trough shape is given in only one direction. So that these sheets increases the load carrying capacity in only one direction due to shell and folded plate action. But further this folded plate action is achieved in both the directions by making the shape of these G.I. and A. C. Sheets by square grid with alternate folds in both the directions, the further load carrying capacity will increase. e. g. the folds of this grid pattern of G.I. and A. C. Sheets should appear in alternate forms in both the directions. For more explanation let us take the example of chess board in which the white colour indicated the top upward fold where as black colour indicates the bottom downward fold. In each upward and downward fold the provision water channel can be made which also acts as a stiffener and further increases the load carrying capacity.

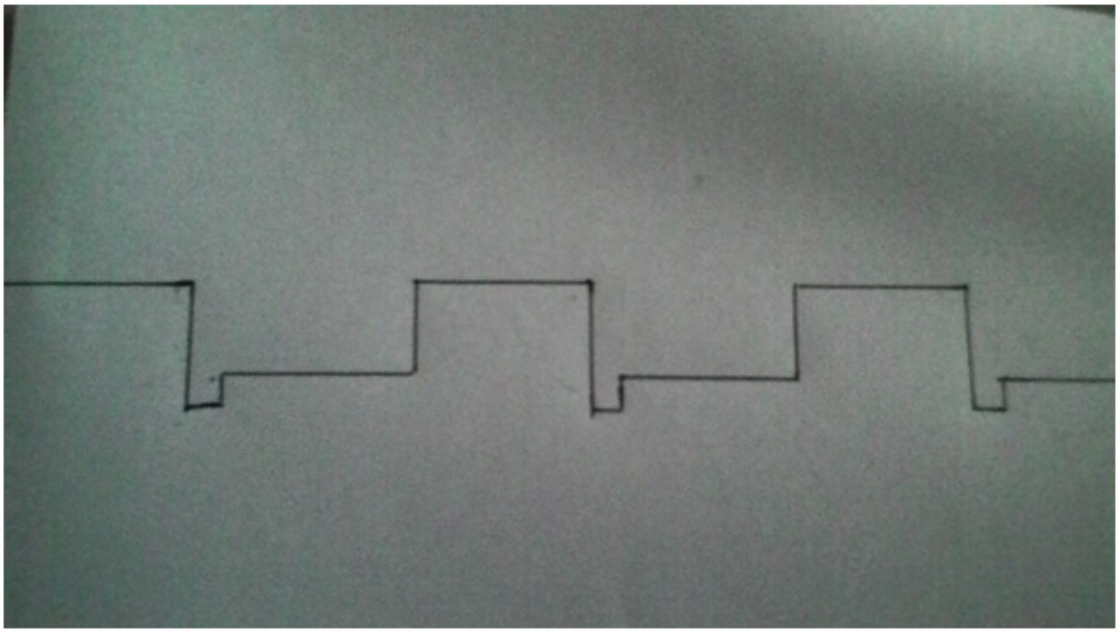

Fig 2 profile/ shape of G. I. and A. C. Sheets in both the directions

The folds of rectangular or trapezoidal trough shaped can be used for G. I. and A. C. Sheets. The dimensions and number of folds can be varied as per the requirement and the material used. e.g. for G.I sheets the square grid of each fold can be made of 100 mm each with 20 to 30 mm water channel in between each fold in both the directions.

Such G.I. and A.C. sheets take more loads and prove economical along with good architectural view with greater fixing property.

CONCLUSIONS AND SALIENT FEATURES

1. The load carrying capacity of the slabs can be enhanced by the action of folded plate by making the profile of the reinforcement as rectangular trough, trapezoidal trough, corrugated shape in one or two directions.
2. The moment carrying capacity, shear resisting capacity and ductility can be enhanced with reduced deflection, cracking, and self weight.
3. The grid pattern of up and down folds along with water channels provided in G.I and A. C. Sheets increases the load carrying capacity, good interlocking arrangement and good architectural view with reduced supporting structure. Also such roofing panels may be used and designed for longer spans.

REFERENCES

1. Sidramappa Shivashankar Dharane," Effect of Shape of Main Reinforcement In Slabs"," International Journal of Civil Engineering And Technology (IJCIET)", ISSN 0976 – 6308 (Print) ,ISSN 0976 – 6316 (Online) Volume 5, Issue 8, August (2014), pp. 01-03
2. Dr. K.S. Satyanarayanan and T.V. Srinivas Murthy," Assessment And Rehabilitation of An Existing Roofing System Subjected To Cyclonic Wind Loads"," International Journal of Civil Engineering and Technology (IJCIET)", ISSN 0976 – 6308 (Print) ,ISSN 0976 – 6316 (Online) Volume 3, Issue 2, (2014), pp. 144 – 153.
3. Sidramappa Shivashankar Dharane, Madhukar Ambadas Sul and Patil Raobahdur Yashwant, "Appari's Simple Design – How To Get Extra Energy From Existing Resources" International Journal of Advanced Research in Engineering & Technology (IJARET), Volume 6, Issue 3, 2015, pp. 43 - 51, ISSN Print: 0976-6480, ISSN Online: 0976-6499.
4. Dr. K.S. Satyanarayanan and T.V. Srinivas Murthy, "Earthquake Resistant RCC and Ferrocement Cicular Columns with Main Spiral Reinforcement", International Journal of Civil Engineering and Technology (IJCIET)", ISSN 0976 – 6308 (Print), ISSN 0976 – 6316 (Online) Volume 5, Issue 9, 2014, pp. 100 - 102.
5. Dharane Sidramappa Shivashankar, "Ferrocement Beams and Columns with X Shaped Shear Reinforcement and Stirrups", International Journal of Civil Engineering and Technology (IJCIET)", ISSN 0976 – 6308 (Print), ISSN 0976 – 6316 (Online) Volume 5, Issue 7, 2014, pp. 172 - 175.
6. Sidramappa Shivashankar Dharane, "RCC Beam with Spiral Reinforcement", International Journal of Civil Engineering and Technology (IJCIET)", ISSN 0976 – 6308 (Print), ISSN 0976 – 6316 (Online) Volume 5, Issue 8, 2014, pp. 98 - 100.
7. Sidramappa Shivashankar Dharane and Archita Vijaykumar Malge, "Uniformity and Enhancement in Quality of Education" International Journal of Mechanical Engineering & Technology (IJMET), Volume 5, Issue 8, 2014, pp. 90 - 92, ISSN Print: 0976 – 6340, ISSN Online: 0976 – 6359.